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We provide the first evidence on the performance of private operating firms as acquirers. Private bidders experience greater post-acquisition operating performance improvements compared to public bidders. This effect is not due to differences in target types, merger accounting, financing constraints, private equity ownership or subsequent listing of some private bidders, and is robust to instrumentation. Further analysis of governance arrangements at least partially attributes the private bidder effect to lower agency costs in private firms. Not only do private firms pay lower prices for target firm assets, they also operate them more efficiently by containing overhead costs and capital expenditure.

Keywords: private firms, mergers and acquisitions, operating performance improvements, agency conflicts

JEL Classifications: G34

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1 Introduction

Corporate takeovers are among the largest forms of corporate investment that a firm may undertake. For instance, corporations have spent US$5 trillion on deals worldwide in the year 2015 alone, amounting to 6.8% of world GDP.[1] Given the size and importance of this market, the performance of acquiring firms has received considerable attention in the academic literature. The extant empirical evidence shows that shareholders of acquiring firms earn, on average, close-to-zero and often negative abnormal returns around the time of takeover announcement, and that the projected operating performance improvements often fail to materialize.[2] However, virtually all of the existing evidence on acquirer performance is based on public acquiring firms. There is no evidence on the success of acquisitions made by private firms, which represent a large portion of the real economy and a sizeable fraction of the mergers and acquisitions (M&A) market. Such undersampling has the potential to skew our understanding of takeovers (Netter, Stegemoller, and Wintoki (2011)). Our paper fills this gap and provides the first evidence on the performance of private operating firms as acquirers.

In addition to being interesting in their own right, acquisitions by private firms can also serve as a testing ground for one of the main theories behind poor acquirer performance, namely, agency-driven empire-building and overpayment (Harford (1999), Moeller, Schlingemann, and Stulz (2004), Masulis, Wang, and Xie (2007), Bargeron, Schlingemann, Stulz, and Zutter (2008)). As public firms are subject to considerable separation of ownership and control, they suffer from agency costs of outside equity (Jensen and Meckling (1976)), manifesting in poor acquisition decisions. In contrast, private firms exhibit higher levels of

[1] Source: Thomson Reuters SDC and International Monetary Fund.

[2] Many recent papers provide abnormal return estimates for takeover announcements, including Fuller, Netter, and Stegemoller (2002), Moeller, Schlingemann, and Stulz (2004, 2005), Masulis, Wang, and Xie (2007), and Golubov, Yawson, and Zhang (2015). Operating performance improvements are studied in Healy, Palepu, and Ruback (1992), Harford (1999), Ghosh (2001), Heron and Lie (2002). See also a review paper by Betton, Eckbo, and Thorburn (2008).

ownership by managers and higher levels of ownership concentration, aligning the interests of managers and shareholders and encouraging owners to more closely monitor management (Ang, Cole, and Lin (2000)).[3] If agency conflicts are one of the reasons behind the poor performance of public acquirers, and if private firms face fewer such conflicts, we would expect private firms to outperform public firms as acquirers.

Using a dataset covering both public and large private firms in the U.S., we examine differences in post-takeover performance between these two types of acquirers. In the absence of stock price data for private firms, we focus on real operating performance improvements. While the data on private firms are generally unavailable, we take advantage of the fact that certain private firms are required to disclose their financials to the U.S. Securities and Exchange Commission (SEC) because of the size of their assets or because they have publicly traded debt. Although not representative of a typical private firm, these private firms are observably comparable to public firms in terms of size and information availability through 10-K filings.

Our analysis is based on a sample of 6,386 acquisition deals over the period 1997-2010 drawn from Capital IQ, which provides both transaction data and the firms' financials. Of these deals, 1,065 were conducted by private bidders and the remaining 5,321 by public bidders. We find that, on average, private bidders experience significantly greater operating performance improvements. Public acquirers experience changes in their return on assets (Δ ROA) of -0.38%, -0.88%, and -1.41%, in the first one, two, and three years after deal completion, respectively. In contrast, private acquirers experience Δ ROA of 6.09%, 5.77%, and 2.01% over the same one, two, and three year periods following deal completion. Improvements in asset utilization, as measured by changes in asset turnover (Δ ATO), are also

[3] Gao, Harford, and Li (2016) provide evidence on the ownership structure of public versus private firms. An average public firm in their sample exhibits CEO ownership of 4.05% and ownership concentration by top 5 outside shareholders of 18.09%. For private firms, these statistics are 10.74% and 49.32%, respectively. Our later analysis confirms this.

higher when the bidder is private. Industry or control-firm adjustment of the performance measures makes little difference to these magnitudes.

Regression analysis confirms that an acquirer's listing status, rather than observable differences in bidder, target, or deal types, generates differences in operating performance improvements. In the baseline specification, we regress Δ ROA and Δ ATO following the deal on an indicator for private bidders and controls for acquiring firms' pre-deal characteristics, bid attributes, as well as year and industry fixed effects. The results indicate that private acquirers have significantly greater improvements in ROA and ATO one, two, and three years following the deal after controlling for the acquiring firm's size, prior performance, growth opportunities (age), target firm type (public versus private), relative deal size, industry relatedness, and hostility. These results are consistent with the conjecture that private bidders are subject to fewer agency conflicts, leading to better acquisition decisions. We further explore the sources of superior operating performance improvements by private bidders and find that they come from containing overhead costs and capital expenditure.

Before examining the agency cost channel, we first rule out several alternative explanations for the private bidder effect and address obvious identification concerns. First, it is possible that private bidders simply go after targets with higher levels of ROA/ATO than target firms acquired by public firms, resulting in greater combined firm profitability. This does not appear to be the case. In the subsample of deals where the target firms' financials are available, we show that targets of private bidders are *not* more profitable than those of public bidders.[4] A second potential explanation has to do with merger accounting. If public bidders pay higher prices for target firm assets (as shown by Bargeron, Schlingemann, Stulz, and Zutter (2008) for public targets), then more accounting goodwill is created in acquisitions by public firms, resulting in higher book value of assets of the combined firm.

[4]In addition, if targets of private bidders were more profitable, this would be reflected in higher prices paid for those assets (holding risk constant). In fact, we find the opposite.

Holding cashflows constant, a larger denominator in ROA and ATO ratios leads to lower post-deal ROA and ATO of the combined firm, potentially underestimating performance improvements of public bidders. We examine transaction multiples (EV/Book, EV/Sales, EV/EBITDA) paid by private versus public bidders, and find that private bidders, indeed, pay lower prices for target firm assets. However, we show a similar private bidder effect on post-takeover performance when using changes in return on sales (Δ ROS) - a measure of performance improvement that is free from merger accounting effects.

A third possibility is that private firms are financially constrained and can only finance their best acquisition, whereas public firms can finance more marginal deals, resulting in lower average gains in profitability for public firms. However, we are able to rule this explanation out by showing that the private bidder effect is driven by firms that are characterized as *less* financially constrained. Finally, private acquirers could be going public following acquisitions. If so, greater operating performance improvements of private bidders could be due to IPO-enabled opportunities rather than their acquisitions. Nevertheless, we show that the results continue to hold when we exclude firms that change their listing status in the post-acquisition period.[5]

Lastly, as the firm's listing status is likely endogenous, the private bidder effect may be picking up omitted firm characteristics rather than the effects of ownership type itself. We address these identification concerns via matching and instrumental variables techniques. We continue to find a positive effect of a bidder's listing status on post-takeover performance improvements when we match private bidders to public bidders with the closest propensity to be private based on observable characteristics, as well as when we instrument listing status

[5]Note that, to the extent that private firms are not subject to the same capital market pressures emphasizing short-term profitability as public firms are, private firms are more likely to undertake deals that result in long-term value creation at the expense of immediate effects on earnings. At the same time, public firms may be coerced into deals that result in near-term improvements in profitability. If this is the case, our analysis focusing on the first three years following the deal is biased against finding greater operating performance improvements for private bidders.

with venture capital availability in the firm's headquarter state during its early years, as in Asker, Farre-Mensa, and Ljungqvist (2015).

In the final part of the paper we investigate whether the private bidder effect can, indeed, be attributed to differences in agency costs/incentive alignment between public and private firms. First, we show that the private bidder effect is strongest when external governance pressure from competition in the product markets is weak, necessitating strong internal governance. Second, we compare firm-level governance arrangements of public and private firms in our sample and investigate whether these differences can account for the private bidder effect. We take advantage of Capital IQ's coverage of antitakeover defences for both public and private firms.[6] We further complement these data with hand-collected information on CEO ownership and ownership concentration by outside shareholders for both public and private firms. As anticipated, private bidders employ significantly fewer provisions limiting shareholder control and exhibit greater levels of CEO ownership and ownership concentration by the largest shareholders. Finally, and most importantly, we show that the private bidder effect is driven by private bidders with fewer takeover defences, higher CEO ownership, and higher ownership concentration by outside shareholders. Overall, the evidence is consistent with the agency cost/incentive alignment channel behind the private bidder effect.

While our matching-based and IV-based tests address concerns regarding endogeneity of a firm's listing status, we acknowledge a potential sample selection issue that remains. As noted at the outset, private firms in Capital IQ are not representative of a typical private firm in the economy. Therefore, our results are not immediately generalizable to the overall population of privately-owned companies. Note however, that to the extent that the channel behind the private bidder effect is lower agency conflicts (as we have shown), a typical private firm exhibits even less separation of ownership and control than the private firms we study.

[6]Note that most of our private bidders have more than 500 shareholders, rendering takeover defences relevant even for private firms. In addition, these provisions capture limitations to shareholder control more broadly, beyond takeover situations.

This paper contributes to the M&A literature by providing the first evidence on the performance of acquisitions made by private operating firms. Our results thus complement prior research that was limited to public acquirers.[7] In doing so, we also reaffirm one of the major reasons for poor performance of acquiring firms proposed in the literature, namely, the agency problem. Moreover, our findings help interpret some of the prior results in this literature. In particular, Bargeron, Schlingemann, Stulz, and Zutter (2008) show that private firms pay lower premia relative to public bidders – a result we confirm in a broader sample of deals using transaction multiples. There are two possibilities: either private firms are more disciplined due to better incentive alignment, or they simply enter deals with lower synergy gains that would naturally warrant lower prices. Our results on greater operating performance improvements suggest it is the former case, and further demonstrate that, not only do private bidders pay lower prices for target firm assets, they also operate those assets more efficiently. Finally, our paper contributes to the nascent literature that studies the characteristics of private firms (Brav (2009), Saunders and Steffen (2011), Michaely and Roberts (2012), Gao, Harford, and Li (2013), Asker, Farre-Mensa, and Ljungqvist (2015), Bernstein (2015), Xiong and Sacchetto (2016)). We expand this set of studies by providing new evidence on the effect of private ownership on post-acquisition performance, and, by extension, on the quality of private firms' investment decisions more broadly.

The rest of the paper proceeds as follows. Section 2 reviews related literature. Section 3 describes our sample. Our empirical analysis is presented in Section 4. Finally, Section 5 concludes the paper.

[7]The only exception is a study by Maksimovic, Phillips, and Yang (2013) who use plant-level data for U.S. manufacturing firms to study public and private firm participation in merger waves. They show, among, others, that productivity gains (measured by total factor productivity) following plant acquisitions are greater when the buyer is public. Our results are not necessarily in conflict, because i) our sample is not limited to manufacturing firms, and ii) we measure efficiency gains as changes in overall operating profitability at the firm level, which takes account of various expenses not captured in total factor productivity.

2 Literature Review

There is a large literature examining takeover gains to acquiring firms, though virtually all papers are limited to studying public acquirers and use abnormal stock returns to measure takeover gains (see Betton, Eckbo, and Thorburn (2008) for a complete summary of the literature). In general, evidence on the ability of acquiring firms to generate value through takeovers has been mixed. Fuller, Netter, and Stegemoller (2002) study abnormal returns for public firms that acquired five or more targets within a three-year period, showing that public acquirers gain when buying a private or subsidiary firm, but lose or break-even when buying a public firm. In a sample of acquisitions by public firms from 1980 to 2001, Moeller, Schlingemann, and Stulz (2005) show that acquiring-firm shareholders lose $25.2 million on average upon announcement. Moeller, Schlingemann, and Stulz (2004) show that returns to public bidders decline with the size of the bidder, a result they attribute to greater agency problems/weaker incentive alignment at larger firms. Along these lines, Masulis, Wang, and Xie (2007) show that poorly governed public bidders – as measured by their use of antitakeover provisions – exhibit lower returns than better governed bidders. Since private firms tend to be smaller and use fewer provisions limiting shareholder control, the classic agency view would predict that private bidders should make better M&A decisions.

In the voluminous M&A literature, only two papers have touched upon private acquirers. Bargeron, Schlingemann, Stulz, and Zutter (2008) investigate all-cash takeovers of U.S. public targets by private and public bidders from 1990 to 2005. They find that private equity bidders pay 63% lower premiums relative to public bidders, and that private operating companies (the focus of our paper) pay 14% lower premiums relative to public firms. Our paper differs in that we study actual efficiency gains realized in takeovers by private firms, and that our sample is not limited to public targets. Maksimovic, Phillips, and Yang (2013) study a sample of acquisitions by manufacturing firms in the U.S. using plant-level data

from the Annual Survey of Manufactures. They find that productivity gains, measured by total factor productivity, are greater when the buyer is a public firm. Our sample is not limited to manufacturing firms, and our measures of efficiency gains take into account overall profitability at the firm level.

We also join a small but growing literature that studies private companies. Sheen (2012) and Asker, Farre-Mensa, and Ljungqvist (2015) find that private firms invest more and are more responsive to investment opportunities. Gilje and Taillard (2016) examine a unique dataset of U.S. natural gas producers and show that investment by private firms reacts less to changes in natural gas prices. Brav (2009) and Saunders and Steffen (2011) investigate the financial policies of private and public firms in the U.K. and find that private firms face higher costs of external finance. Michaely and Roberts (2012) study dividend policies of public and private firms in the U.K. and find that private firms smooth dividends significantly less than public firms. Gao, Harford, and Li (2013) shows that private firms hold, on average, about half as much cash as public firms do. Xiong and Sacchetto (2016) quantify the effects of agency and financing frictions on firm value for private and public firms using a structural estimation approach. They find that large private firms face fewer agency problems than their public counterparts.

3 Data and Basic Statistics

3.1 The sample

Our primary data source is the Capital IQ database. Starting from the late-1990s, Capital IQ provides data on U.S. firms' M&A activity and financial information with a similar level of detail as provided by SDC Mergers and Acquisitions Database and Compustat for public firms. We start with U.S. public firms traded on the NYSE, Nasdaq, or Amex. A private firm is required not to have shares traded on any major stock exchange or OTC market.

In Capital IQ, private firm observations mainly come from Form 10-K and from Form S-1. In U.S., firms have to file financial reports with the Securities and Exchange Commission (SEC), if they have $10 million or more in total assets and 500 or more shareholders (2,000 shareholders since April 2012), or if they list their securities with the SEC, like public debt. Capital IQ collects private firms' financial data from the SEC through 10-K or S-1. In our final sample, data for most private firms (96%) come from 10-K, and the remainder (4%) comes from S-1. Most private firms in the sample are large or have access to public debt. Although they are not representative of a typical private firm, this makes them comparable to public firms in terms of size, disclosure requirements and information availability.

We collect the sample of U.S. mergers and acquisitions from Capital IQ. M&A data from Capital IQ, in particular, data on leveraged buyouts, have been used in a recent study by Axelson, Jenkinson, Stromberg, and Wesibach (2013). Following the literature, we collect all completed transactions for the period 1997 to 2010 (to allow for 3 years worth of post-acquisition performance data) in which the acquirer owns 100% of the shares of the target after the deal. We exclude all deals with non-operating targets, with missing deal values, and where the bidder is a group of investors. We further remove all regulated or financial bidders with SIC code between 4900 and 4999 or between 6000 and 6999. Since our main variable of interest requires the operating performance before the deal to be available, we require all acquirers to have financial data in the year prior to the deal. The resulting sample consists of 8,760 deals involving a public bidder and 1,176 deals by private bidders.

Since a private bidder does not have publicly traded equity to offer, it is not surprising that most acquisitions by private bidders are cash deals. In the initial sample, more than 90% of acquisitions by private bidders are all-cash deals. In contrast, about 40% of public bidders use all-stock payment or mixed offers. To obtain a sample where deals are most comparable between public and private acquirers, we exclude all non-cash deals. Excluding non-cash deals results in a final sample of 6,386 deals where 5,321 deals involve a public

bidder and 1,065 deals by private bidders, although the sample size varies across tests due to the availability of the relevant outcome and control variables.[8]

Table 1 reports the distribution of the number and the aggregate value of the transactions measured in 2009 purchasing power through time. In total, public firms participate more than private firms as buyers of assets in mergers and acquisitions. Among all deals, 83% of the deals involve a public bidder, with 17% deals involving a private bidder. In contrast, most target firms are private.

3.2 Summary statistics

We collect all financial performance measures and deal characteristics from Capital IQ. We focus on bidder and deal characteristics that both empirical and theoretical literature has found to be important. Panel A of Table 2 compares bidder characteristics between public and private acquirers for one year before the deal completion.[9] Variable definitions are given in Table A.1 in the Appendix. The first two variables are total assets and operating income measured in CPI-adjusted 2009 dollars. It is not surprising that public bidders are larger than their private counterparts in total assets and operating income. We consider a measure of leverage equal to the ratio of long term debt to total assets. We find that private acquirers are much more levered than public acquirers. Consistent with Gao, Harford, and Li (2013), we also find that public bidders hold, on average, about 50% more cash than private bidders do. As suggested by Jensen (1986), companies with substantial cash flows and low leverage ratio are prone to agency problems of free cash flow, and thus managers of firms with large

[8]We have compared Capital IQ M&A data coverage with that of Thomson Reuters SDC. Applying the same sample selection criteria to both databases, we find that Capital IQ and SDC coverage of acquisitions by public bidders is very similar, but coverage of acquisitions by private bidders is significantly better in Capital IQ. For instance, before requiring financial data to be available, we find 5,322 deals by public bidders in Capital IQ compared to 5,624 deals in SDC. As for deals by private bidders, we find 7,523 deals in Capital IQ but only 978 deals in SDC. Thus, Capital IQ coverage of M&A deals by private firms is more comprehensive.

[9]It is interesting to also compare the characteristics of target firms. However, financial information for target firms is limited, because most targets are relatively small private firms that are not required to disclose to the SEC. Nevertheless, below we will investigate target firm profitability in a subsample of deals.

free cash flows are more likely to undertake inefficient or even value-destroying corporate takeovers.

Private bidders tend to be younger firms, with significantly lower firm age compared to public bidders. Private bidders also have fewer industry segments than public bidders. On average, a private bidder has 1.81 industry segments, whereas an average public bidder has 3.43 segments. There is no significant difference in the ratios of tangible assets to total assets (Tangibility), capital expenditure (CAPEX/Total assets), and one year percentage change in total revenue (Sales growth) between public and private bidders. However, the average public bidder spends 3.2% of capital on R&D, substantially higher than 1.2% of the average private bidder.

Panel B of Table 2 reports several deal characteristics, which are also obtained from Capital IQ. We find no statistical difference in the mean dollar value of the deals measured in CPI-adjusted 2009 dollars for public acquiring firms relative to private acquiring firms. In other words, the transaction sizes are similar across public and private bidders. The proportion of hostile acquisitions is greater when a bidder is public than when a bidder is private, although the difference is not statistically significant. Public bidders are less likely to be involved in solicited deals than private bidders. A large fraction of targets consists of firms with a two-digit SIC code other than that of the bidder, but that fraction is similar across public and private bidders. The fraction of non-US targets is slightly higher for private bidders.

Finally, we compare our sample bidders to the full population of firms in Capital IQ (public and private, respectively). We remove observations with missing SIC codes, zero or negative total assets and gross capital stock. Following the literature, we also exclude all financial or regulated firms with SIC codes between 4900-4999 and between 6000-6999. These screens result in a final sample of 23,286 firm-year observations for 2,189 public firms and 9,920 firm-year observations for 3,283 private firms, over the period from 1997 to 2010.

Table A.2 in the Appendix reports mean and median values for firm characteristics for bidders and the full population. For both public and private companies, almost every firm characteristic is significantly different between bidders and the average firms. A bidder is much larger than the average firms in terms of total assets and operating income. Typically, a bidder firm tends to be older and have more industry segments than the average firm. We also find that the average firm holds more cash, owns more net property, plant and equipment, invests more, and spends more on its research and development than bidding firms do. However, private bidders rely less on debt compared to all private firms, while public bidders rely slightly more on debt relative to all public firms.

4 Main Results

In this section, we investigate the differences in post-acquisition operating performance improvements between public and private acquiring firms. We focus on operating performance during the first three years after the deal for all bidding firms with post-deal financial information, since market-based valuations for private firms are not available. We first explore these characteristics at the univariate level and then continue with regression analysis.

4.1 Univariate comparisons across bidder types

Our main measure of operating performance is return on assets (ROA): operating income before depreciation divided by total assets. Operating income captures the cashflows of the underlying business and is not affected by differences in capital structure, taxes, and depreciation policy. Scaling by total assets partially controls for divestitures and differences in growth and size. Broadly speaking, ROA can be interpreted as measuring the efficiency with which the acquiring firms use a given amount of assets, and changes in ROA can be interpreted as improvements in this efficiency. As an additional measure of efficiency, we look

at asset turnover (ATO), defined as sales divided by total assets. This ratio captures the efficiency with which the firm is using its assets to generate revenue, and the post-takeover changes measure improvements in productive asset utilization. We will also examine return on sales (ROS) in our later analysis.

Following Kaplan (1989) and Maksimovic, Phillips, and Yang (2013), we examine operating performance during the first three years after the deal. Specifically, we measure the change in the performance metric from the last year prior to deal completion (year -1) to years one, two, and three following the consummation of the deal. We scale this change by the absolute value of pre-deal performance to facilitate interpretation and to make economic magnitude of the results readily apparent. This is consistent with the literature on operating performance improvements following leveraged buyouts (e.g., Kaplan (1989) and Guo, Hotchkiss, and Song (2011)).[10] We exclude year 0 (the year of completion) as those figures are difficult to interpret as pre- or post-deal performance. Furthermore, accounting measures in year 0 may be abnormal due to deal-related fees and asset write-ups. In all subsequent tests we trim the sample by removing the 5th and 95th percentiles of the dependent variable to reduce the influence of outliers.

The first panel of Table 3 reports raw (unadjusted), industry-adjusted, and control-firm-adjusted mean percentage changes in ROA and ATO for private bidders. Industry-adjusted and control-firm-adjusted measures attempt to provide a measure of abnormal performance changes. Industry-adjusted performance improvements are net of the median performance change of the bidder's 2-digit SIC industry over the same period. Control-firm-adjusted performance improvements are net of the contemporaneous performance change of a control firm chosen in year -1. The control firm is of the same listing status, comes from the same 2-digit SIC industry, and has the level of ROA in year -1 closest to that of the bidder

[10] Our conclusions are the same when using percentage point (unscaled) changes. See Table A.4 in the Appendix.

(this is prior-performance-matching as recommended by Barber and Lyon (1996)). During the first three years, ROAs of private bidders improve by 6.09%, 5.77%, and 2.01%, all significantly different from zero. Turning to ATO, the improvements are 3.64%, 4.61%, and 5.06% in years one, two, and three, respectively. Using industry-adjusted and control-firm adjusted performance improvements, we continue to find that private bidders experience positive changes in ROA and ATO, albeit the magnitude is somewhat reduced and not all of them are significantly different from zero. In subsequent regression analysis, we will use raw (unadjusted) performance improvements in conjunction with year and industry fixed effects, as recommended by Gormley and Matsa (2014).

The second panel of Table 3 reports the same outcomes for public bidders. On average, public bidders experience negative changes in ROA of −0.38%, −0.88%, and −1.41% in years +1, +2, +3 on an unadjusted basis, respectively. The same pattern is observed for ATO, where mean percentage changes are −0.79%, −1.53%, and −1.49%, in years one, two, and three, respectively. Most of the changes are also significantly different from zero. Once again, industry-adjusting or control-firm adjusting performance improvements does not change the picture: on average, public bidders experience zero-to-negative changes in ROA and ATO following mergers. The bottom panel of Table 3 reports differences between public and private firm changes in ROA and ATO. These differences are large and statistically significant across all years and performance measures. Overall, private bidders exhibit incremental 3–6% improvements in ROA and ATO.[11]

One may argue that private bidders could be simply going after more profitable targets, thereby resulting in higher combined firm profitability. However, this is likely to be offset by the higher asset base of the combined firm due to higher prices paid for more profitable assets (holding risk constant). Moreover, we will show later that, for a subsample of deals

[11] We also perform these univariate tests using median Δ ROA and Δ ATO, and the main regression tests using quantile regressions estimated at the median. Our conclusions are unchanged. Please see Table A.5 in the Appendix.

where the target firm financials are available, firms targeted by private bidders are not more profitable than those targeted by public bidders.

Finally, we investigate whether the better performance of private firms was because of the acquisition. If not, private firms, in general, will exhibit higher levels of ROA and ATO growth than public firms do. However, we do not find this. These results are reported in the Appendix. For this analysis, we focus on the entire population of private firms in Capital IQ and use both the full sample and a matched sample of public firms. Following the literature such as Gao, Harford, and Li (2013) and Asker, Farre-Mensa, and Ljungqvist (2015), we match private and public firms with replacement based on size and industry. For each private firm, we select a matched public firm closest in size (total assets) from the same 2-digit SIC industry and year. If no match is found, we discard the observation from the sample. After matching, the sample contains 9,490 observations for 2,189 public firms and an equal number of observations for 3,283 private firms. We have a sample of all public firms collected from Capital IQ and a sample of matched public firms. We then compare changes in operating performance between private and public firms one, two, and three years in the future. Table A.3 presents these results. Panel A presents the comparisons for the overall universe of public and private firms. One-year ROA growth of private firms is higher by 1.51%, but this turns negative for years two and three. Private firms in the population have lower changes in ATO one and two years out, turning to somewhat higher in year +3.

Panel B repeats the comparisons using a matched sample of public firms. In this comparison, private firms exhibit lower one-year, two-year, and three-year changes in ROA, with the three-year change also being statistically significant. There are no significant differences in ATO changes, except for a three-year change that is slightly higher for private firms. Overall, when looking at the entire population, we do not find consistent evidence of inferior operating performance changes of public firms relative to private firms. Hence, our results on superior operating performance improvements for private bidders can be more readily

attributed to their acquisitions.

4.2 Baseline regressions

The univariate comparisons provide evidence that private acquiring firms are more successful in generating cash flows than their public counterparts after acquisitions. To investigate whether firm's listing status indeed accounts for these differences between public and private acquirers we conduct regression analysis that controls for main observable differences in deal types and bidder attributes. We first estimate a regression of the changes in ROA on the private bidder indicator and a set of controls. We run the following regression model:

$$\Delta ROA(-1,+j) = \alpha + \beta_1 PrivateBidder + \beta X' + IndustryFEs + YearFE + \varepsilon,\ j = 1,2,3 \quad (1)$$

The dependent variables are percentage changes in ROA for acquirers using three windows, $(-1,+1)$, $(-1,+2)$, and $(-1,+3)$, with year 0 being the transaction year. Δ ROA$(-1,+1)$ is the percentage change in return on assets from $t-1$ to $t+1$. Similarly, Δ ROA$(-1,+2)$ and Δ ROA$(-1,+3)$ measure the percentage changes in return on assets from $t-1$ to $t+2$ and from $t-1$ to $t+3$. The variable $PrivateBidder$ is an indicator variable which is equal to one if the bidder is a private firm, and zero otherwise. Vector X contains controls for prior performance (the level of and the change in ROA prior to the deal), size ($Log(revenue)$), as well as additional bidder and deal characteristics found important by prior literature, namely a dummy for private targets, relative size of the deal (deal value to total assets) and its square, age of the bidder (in logs), and dummies for hostile deals, solicited deals, and diversifying deals. Industry (2-digit SIC) fixed effects and year fixed effects are included to absorb time-invariant industry effects or year-specific variation in operating performance changes (the results are identical if we use industry-year fixed effects). The coefficient on $PrivateBidder$, β_1, is of interest.

Table 4 shows that on average private acquiring firms experience greater improvements in profitability than public acquiring firms in terms of ROA. The coefficient on *PrivateBidder*, the indicator for whether the bidder is private, is positive and significant at the 1% level for the first and second post-takeover years, and at the 5% level for the third post-takeover year. Private acquirers realize an incremental 9.5% increase in ROA during the year after the acquisition, 9.1% two years after the acquisition, and 7.4% three years after the acquisition compared to public acquirers. We also find that the coefficients on ROA(-1), Δ ROA$(-2,-1)$, and $Log(revenue)$ are negative in all columns and significant in most, suggesting a negative impact of the bidder's pre-deal operating performance and size on subsequent improvements. The negative effect of size on post-takeover performance is consistent with evidence in Moeller, Schlingemann, and Stulz (2004) based on announcement period returns.

Table 4 also reports the regression estimates for Δ ATO as the measure of operating performance improvement. The specification is the same except that controls for prior performance measure prior level and growth in ATO instead of ROA. Again, we find that private acquirers realize greater improvements in ATO than public acquirers. The coefficients on *PrivateBidder* are positive and statistically significant at the 1% level for all years. The incremental improvements in ATO are on the order of 5.9–7.8%. The coefficients on ATO(-1), Δ ATO$(-2,-1)$, and $Log(revenue)$ are negative and significant in all of our specifications, consistent with the regression estimates using ROA as the performance measure.

Overall, there is strong evidence that acquiring firm listing status strongly affects post-takeover performance. This result holds after controlling for numerous potential confounding effects, such as differences in acquirer size, prior performance, growth opportunities (age), relative deal size, and target type (private vs public target). So far our results are consistent with the notion that private bidders make better acquisition decisions, as predicted by classic agency theory. In the following sections we will explore robustness of this finding, rule out possible mechanical explanations, address identification concerns, and examine the

hypothesized agency channel behind this effect.

4.3 Possible explanations

4.3.1 Do private bidders buy more profitable targets?

So far we find higher improvements in ROA and ATO for private bidders following takeovers. One possible explanation is that private acquirers simply pick targets with higher levels of operating performance. Note that we compare pre-deal operating results of the bidder with the post-deal operating results of the combined firm assets. Private bidders could simply go after target firms with higher levels or growth in ROA or ATO than target firms acquired by public firms. To investigate this concern, we examine target firms' pre-deal performance. However, this analysis is limited to a subsample of target firms with financial information available from Capital IQ, because most target firms are private and small. We measure the level as well as the percentage changes of the target firm's ROA and ATO in the last fiscal year prior to deal completion (relative to two years prior in the case of changes). Table 5 reports target's pre-deal performance. We find that public acquirers pick target firms that have somewhat higher growth rates (Panel B), although the differences are not statistically significant. This suggests that, if anything, our results are biased against finding greater performance improvements for private bidders. There are no discernible differences in levels of ROA and ATO (Panel A) of the targets of public and private bidders.

Another way to assess whether targets of private bidders are more profitable is to examine prices paid for those assets. If targets acquired by private bidders are more profitable, one would expect higher prices paid for those assets. Panel C examines mean and median transaction multiples paid by public and private bidders. We use deal value to total assets, deal value to sales, and deal value to operating income before depreciation. These multiples approximate price-to-book, EV/Sales and EV/EBITDA valuation multiples. We find that

private bidders consistently pay lower prices for their targets: all transaction multiples are significantly lower for targets acquired by private firms. This result confirms the findings of Bargeron, Schlingemann, Stulz, and Zutter (2008) who find that private bidders pay lower bid premiums for comparable public targets. Overall, there is no evidence that targets of private bidders are more profitable, ruling out this as a possible explanation for better post-takeover performance of private firms.

Finally, Panel D repeats the regression analysis in Table 4 on a subsample of deals with target firm financials available, and we use the weighted-average performance of the bidder and the target in year $t-1$ in the computation of the dependent variable. Only the coefficient of interest is reported. The sample size declines significantly to about 900 observations (with only about 100 acquisitions by private firms), suggesting that power may be an issue. Nevertheless, we continue to find a positive and significant private bidder effect in 4 out of 6 specifications.

4.3.2 Merger accounting

Second potential explanation we address has to do with merger accounting. Under U.S. Generally Accepted Accounting Principles (GAAP), the bidder has to account for the entire purchase price on its balance sheet. Any value in excess of the (stepped up) value of identifiable assets is recognized as goodwill.[12] If public bidders pay higher prices (as we have shown above), then more accounting goodwill is created, resulting in a higher accounting asset base for the combined firm. Since we measure ROA as the ratio of operating income to total assets, this can potentially explain why public acquirers have smaller post-deal ROA and the associated changes from before to after the deal. To mitigate this measurement concern, we use return on sales (ROS), as in the Custodio (2014) study of the diversification discount. Similar to ROA, we measure the annual percentage changes in ROS in the first three years

[12]This is also the case under International Financial Reporting Standards (IFRS).

following deal completion (years +1, +2, +3) relative to the most recent fiscal year prior the deal completion (year −1). Panel A of Table 6 reports univariate analysis, and Panel B reports the results of regressions analysis using this alternative measure of performance improvements. Our results continue hold. Univariate differences in ROS improvements are all statistically significant. Similarly, the coefficients on the *PrivateBidder* indicator are positive and significant at the 1% level for windows $(-1, +1)$ and $(-1, +2)$, and at the 5% level for window $(-1, +3)$. The magnitude of the effect is comparable to prior analysis using ROA and ATO, with 6-8% greater improvements in profit margins for private bidders. Therefore, merger accounting effects cannot be the explanation behind better ROA and ATO improvements for private bidders.

4.3.3 Access to capital

Another reason for better observed performance of private bidders could be the fact that they are more financially constrained. Specifically, if private firms are more financially constrained, they could finance only their best acquisition opportunity, whereas less constrained public bidders are able to finance more marginal deals, bringing the average post-takeover performance improvements of public firms down. Note that this still implies that private firms make more value-creating deals, it is just that agency conflicts that we alluded to in the introduction is not the reason behind it. Preliminary investigation of the data suggests that this is a valid concern: private bidders in our sample conduct an average of two acquisitions, while public firms conduct an average of four deals.

To formally test this explanation, we proxy for financing constraints with three different variables. First, we employ the SA index from Hadlock and Pierce (2010), who show that it performs better than the Kaplan-Zingales index (Lamont, Polk, and Saa-Requejo (2001)) and the Whited-Wu index (Whited and Wu (2006)).[13] The SA index is based on firm char-

[13]Besides, the computation of the Kaplan-Zingales and Whited-Wu indices require numerous financial

acteristics that predict actual qualitative assessments by management of their firms' ability to access capital. Hadlock and Pierce (2010) show that firm size, size-squared, age, leverage and free cash flow are consistently associated with financing constraints. While leverage and free cash flow do incrementally predict the level of financing constraints (positively and negatively, respectively), Hadlock and Pierce (2010) choose to avoid these arguably more endogenous variables in the construction of their index.[14] We therefore use leverage and free cash flow separately as additional indicators of financing constraints. According to Hadlock and Pierce (2010), high levels of SA index, high leverage, and low free cash flow are symptomatic of high levels of financing constraints. If limited access to capital is the reason why private firms do better deals, we should find that the private bidder effect is driven by these categories of private bidders.

Table 7 presents the results of our baseline regressions augmented with measures of financing constraints (we use terciles to maximize the signal-to-noise ratio of the proxies) and a full set of their interactions with the private bidder dummy (effectively splitting the private bidder dummy into three). Panel A uses the SA index of Hadlock and Pierce (2010) as our first proxy for financing constraints. Interestingly, the private bidder effect is concentrated in private bidders with medium and low levels of SA index - opposite to what the access to capital explanation predicts. Panels B and C use free cash flow and leverage, respectively, as two additional proxies for financing constraints. Once again, we find results inconsistent with access to capital explanation of the private bidder effect: it is driven by private bidders with medium and high free cash flow, and with medium and low leverage (less constrained private bidders). Finally, in unreported results we also verify that the private bidder effect

variables that are often missing for private firms.

[14]Specifically, we construct the SA index as $(-0.737 * Size) + (0.043 * Size^2) - (0.040 * Age)$, where $Size$ is the log of book assets, and Age is the number of years from foundation. Following Hadlock and Pierce (2010), size is winsorized (i.e., capped) at the log of $4.5 billion, and age is winsorized at 37 years (In Hadlock and Pierce (2010) age is measured as the number of years with non-missing stock price in Compustat. We replace this with the year of foundation since private firms do not have a stock listing. This should not introduce any bias since we are using relative rankings of the index).

continues to hold after controlling for a deal order variable, defined as the number of deals conducted by the bidder since the start of our sample. Overall, it appears that more selective deal making as a result of greater challenges in accessing capital cannot explain the private bidder effect.

4.3.4 Subsequent listing and organizational form

Finally, successful acquirers may change their listing status after the acquisition. For example, private acquirers may choose to go public after their acquisitions. If so, greater performance improvements of private acquirers may be due to the IPO and the infusion of capital to fund growth, not from their acquisitions. In the sample, only 127 (11.92%) private acquirers go public within 3 years after the deal, and no public acquirer goes private within 3 years after the deal. We eliminate these bidders from the sample and rerun the regressions. The results are shown in Panel A of Table 8.[15] The coefficients on *PrivateBidder* remain positive, with magnitudes and significance levels almost identical to those in prior analysis.

We further examine the organizational form of private bidders in our sample. First, we distinguish between independent private firms and those whose ultimate parent is a listed firm. We find that 25% of private bidders in our sample have public firms as their ultimate parents. We then examine whether these bidders perform any differently to independent private firms (one prediction could be that private firms whose ultimate parents are public may suffer from similar agency conflicts as their parents). Panel B of Table 8 reports the coefficient estimates. The indicator *PublicParent* takes the value of one if the bidder is private and its ultimate parent is public, and zero otherwise. It should therefore be interpreted as an interaction effect. Somewhat surprisingly, the coefficient on this variable is statistically insignificant, suggesting that private firms whose ultimate parents are public do not perform any differently to independent private firms. On the other hand, having a public parent can

[15] We report only the coefficients of interest. The specifications are otherwise identical to those in Table 4.

also be seen as another proxy for financing constraints (private firms with public parents should be less constrained). If this is the case, this test provides further evidence against the access to capital explanation for the private bidder effect.

Second, we also investigate whether the private bidder effect is driven by the private equity ownership model. Capital IQ provides information on whether the firm has received private equity sponsorship at any point in time. Similar to the public parent analysis, we define an indicator variable $Non-PEBacked$ that takes the value of one if the bidder is private and has never received private equity investment, and zero otherwise. Panel C of Table 8 reports the estimation results. We find that private bidders that are not currently under private equity equity ownership and have never received private equity backing experience the same levels of operating performance improvements following mergers as independently owned private bidders except for two specification out of the six. Overall, the private bidder effect appears to be common to the private ownership model more broadly.

4.3.5 Endogeneity of listing status

Our results are based on cross-sectional comparisons of public and private bidders. Being public or private is, of course, an endogenous decision. The listing status can be correlated with a variety of characteristics, thus affecting firms' operating performance. Of particular concern is a variable that is positively correlated with the propensity to stay private and, at the same time, positively affects post-takeover operating performance improvements.[16] One potential (imperfect) solution could be to use within-firm variation in public/private status. Unfortunately, there is not enough firms in our sample that change listing status and conduct acquisition both before and after the change.

[16]Note that if the omitted variable correlated with the propensity to stay private negatively affects post-takeover performance, then this would bias our results downward, working against our finding of a positive private bidder effect. The typical narrative, whereby high quality firms/assets select into public status, fits this description - to the extent that asset quality is positively related to performance improvements following takeovers, public firms would be expected to do better than private firms.

To mitigate the concern of selection on observable characteristics, we employ a propensity score matching procedure to reduce the potential selection bias. The matching technique we use is a one-to-one nearest neighbour matching with replacement (Heckman, Ichimura, and Todd (1998)).[17] We start with a probit regression with the private bidder indicator as the dependent variable, using as explanatory variables the logarithm of revenue as a measure of size, the level of ROA and the change in ROA in year -1 as measures of prior performance, natural logarithm of firm age as a proxy for life cycle, as well as cash holdings, leverage, and industry and year fixed effects. We then use the results from the first-stage probit regression to calculate bidding firms' propensity scores (i.e., the probability that the bidder is private, given the set of observable characteristics). We then match each private bidder with a public one by minimizing the absolute value of the differences in their propensity scores. The goal is to compare private bidders to public bidders that were likely to be private given their observable characteristics.

Table 9 presents the results of our propensity score matching analysis. First, Panel A reports the first-stage propensity score estimation results. All variables in the propensity-score model are statistically significant predictors of a bidder's listing status. Smaller, better performing, and younger bidders are more likely to be private. Private bidders also hold less cash and are more levered. This mirrors the univariate differences observed in Table 2. The pseudo-R^2 of the first-stage model is reasonably high at 27.6%. Panel A further reports diagnostics from our matching procedure, namely, mean differences in characteristics entering the propensity score estimation between private bidders and their propensity-score matched public counterparts. None of the differences are significantly different from zero, indicating that our matching procedure successfully eliminates differences that exist prior to matching. Panel B presents differences in Δ ROA and Δ ATO following the deal between private bidders and their propensity-score-matched public counterparts. We find that private bidders

[17] We obtain very similar results if we match without replacement.

improve their ROA and ATO significantly more than their matched public bidders. The differences in operating performance improvements between public and private bidders in the matched sample are of comparable magnitude to those in the full sample analysis. Panel C of Table 9 shows the regression results for the matched sample. We use the same explanatory variables as before. The coefficient on the *PrivateBidder* indicator is positive throughout the specifications, with magnitudes and significance levels close to those in our baseline analysis.

It appears that selection on observable characteristics does not bias our results. Of course, it is still possible that there is an unobserved characteristic that is positively correlated with both private firm status and operating performance improvements following takeovers. To address this concern, we employ an instrumental variable (IV) approach. Here we borrow from Asker, Farre-Mensa, and Ljungqvist (2015) who study investment behavior of public vs. private firms and instrument listing status with venture capital (VC) availability in the firm's headquarter state 2 years after foundation.[18] Specifically, the variable $VCsupply$ is the number of firms receiving first-round VC funding in the firm's headquarter state two years after the firm was founded, scaled by the number of firms in the state that were less than three years old at that time (VC data is from VenureExpert, and the number of firms less than three years old is from the Longitudinal Business Database of the U.S. Census Bureau). The instrument varies by state-year, and the intuition behind its relevance is straightforward: firms are more likely to have gone public at some point if they have received VC backing in their early years. This is because VC investors need an exit event to realize the value of their investment. Therefore, VC availability in the firm's geography two years after its foundation (typical firm age in first-round VC deals) should be positively associated with the likelihood that the firm has early VC investors, which, in turn, increases the probability of an

[18]We thank John Asker, Joan Farre-Mensa, and Alexander Ljungqvist for making their instrument available to us.

eventual IPO. The exclusion criterion (the instrument must not affect the outcome variable of interest other than through its effect on the endogenous variable) is satisfied by the virtue of time separation. That is, even if firms or VC investors were attracted to the particular geography by favorable economic conditions, many years have passed from that time until the measurement of our outcome variable, rendering any such correlation irrelevant. The median age of our private firms at the time of the deal is 20 years, and the median for public firms is 30 years.

Table 10 presents the results of our IV analysis (only the coefficients of interest are shown; other covariates are identical to those used in our main regressions). Panel A reports the first-stage estimation. Following Asker, Farre-Mensa, and Ljungqvist (2015) and Gao, Harford, and Li (2013), we estimate the first stage as a probit regression to avoid imposing a linear functional form on the association between VC availability and ultimate listing status, and then use the predicted probability from this probit regression as an instrument for the firm's listing status in the usual 2SLS model. The relevance of venture capital availability at founding as an instrument for listing status is evident: the $VCsupply$ variable is a strong negative predictor of a firm's private status many years later. The coefficient is statistically significant at the 1% level in all but one specification (where it is significant at the 5% level). The F-test for the excluded instrument is above 10 in all but the last two specifications (where it is close), which is the recommended cut-off value for the case of one endogenous variable and one instrument (Staiger and Stock (1997)). Panel B reports the second-stage estimation results. We find that the instrumented private bidder indicator continues to be positive and significant across all specifications. The private bidder effect in post-takeover performance appears to be robust to instrumentation.

Overall, the results in this sections suggests that our main evidence is unlikely to be picking up unobserved characteristics that are not a direct outcome of being a public versus a private firm.

4.4 The Agency Cost Channel

Our results suggest that post-deal operating performance improvements of private acquirers are better than those of public acquirers. We have examined and ruled out several possible explanations, such as more profitable target firms, merger accounting, access to capital, or benefits of subsequent IPOs.

Why do then private acquirers outperform? We have argued that public ownership comes with greater agency conflicts relative to the more concentrated private ownership. We now investigate directly whether agency costs are, indeed, behind the private bidder effect.

We now investigate directly whether differences in post-takeover performance between public and private firms can be explained by governance quality. While data on the governance arrangements in private firms are scarce, we are able to obtain four such variables, namely, CEO ownership, ownership concentration by top 1 and top 5 outside shareholders, and a takeover defence score.[19] The latter variable comes from Capital IQ, while data on CEO ownership and ownership concentration come from Gao and Li (2015) and Gao, Harford, and Li (2016).[20]

We begin by summarizing the four governance variables for public and private firms. Table 11 presents the statistics. As expected, private firms exhibit significantly higher levels of CEO ownership (0.068 vs. 0.036), and ownership concentration by top 1 and top 5 outside shareholders (0.492 vs. 0.097 and 0.605 vs. 0.168, respectively). In addition, the average takeover defence score for private firms is significantly lower than for public firms (0.24 vs.

[19] Capital IQ covers 24 unique antitakeover and corporate governance provisions, from which it constructs a takeover defence score. In addition to standard antitakeover provisions such as poison pills and classified boards, this index captures such limitations/enhancements of shareholder rights as cumulative voting for board seats, causes for director removal, and limits to amend the corporate charter and bylaws, among others. The score is a number between 0 and 1, where a higher score indicates stronger takeover defences. This takeover defence score is similar to corporate governance indices computed in Gompers, Ishii, and Metrick (2003) and Masulis, Wang, and Xie (2007). Note that most private acquirers in the sample have more than 500 shareholders, resulting in some separation of ownership and control and necessitating the use of takeover defences.

[20] We would like to thank Huasheng Gao for kindly sharing these variables with us.

0.31), indicating that private firms use fewer provisions limiting shareholder rights. Overall, these statistics are consistent with private firms having better incentive alignment between managers and shareholders, as well as monitoring by shareholders. If the private bidder effect is driven by differences in governance quality, we should find that the effect is most pronounced for private bidders characterized by better governance. To that effect, we split the private bidder indicator into three variables by interacting it with the governance proxies and further include the level effects of those proxies (as before, we use terciles to maximize the signal-to-noise ratio). As the private bidder indicator is interacted with a dummy for *each* governance tercile, the coefficients on these interactions show which part of the sample the private bidder effect comes from. Table 12 presents the results.

Panel A uses CEO Ownership as our first governance proxy. As predicted by the agency channel, the private bidder effect is concentrated in firms with high CEO ownership. Panels B and C use the concentration of ownership by the top 5 and top 1 outside shareholders, respectively. Once again, we find that the private bidder effect is driven by firms in the highest tercile of ownership concentration by outside shareholders. The results are somewhat noisier here due to loss of observations (ownership concentration is available only after 2003).

Panel D utilizes takeover defence score as our final direct governance proxy. The private bidder effect is driven by private firms with the lowest level of takeover defence use - again consistent with the agency channel behind the private bidder effect. Finally, Panels E and F employ a proxy for governance pressure from outside the firm, namely, the extent of product market competition. Giroud and Mueller (2010) and Giroud and Mueller (2011) show that pressure from product markets is a powerful governance mechanism that can render firm-level governance arrangements irrelevant. Following these authors, we use the Herfindahl-Hirschman Index (HHI) to measure product market competition. We employ two versions of HHI: one based on 3-digit SIC industries and sales of all firms covered in Compustat, and another one provided by Hoberg and Phillips (2016) that benefits from

incorporating sales by private firms (from U.S. Census data) into the computation of market concentration. The results are again consistent with the agency cost explanation behind the private bidder effect: differences in post-takeover performance are largest for medium and high levels of HHI using both definitions. This implies that the private bidder effect is strongest when products markets are less competitive, necessitating the need for strong firm-level governance arrangements. We argue that private firm ownership structure provides such arrangements, and the above results using direct governance measures confirm this intuition.

Overall, these results suggest that agency problems are, indeed, a channel through which private acquirers outperform public acquirers. While it is possible that there may be other channels at play that we have not considered, the private bidder effect appears to be at least partially due to better incentive alignment in private firms.

Finally, we also examine the sources of superior improvements in operating performance by private bidders to establish the mechanism behind the effect. In results reported in Table 13, we find that private bidders experience greater reductions in selling, general, and administrative expenses (SG&A), but no significant differences in changes in cost of goods sold (COGS). Private bidders also experience greater reductions in CAPEX. Thus, it appears that the mechanism behind superior operating performance improvements by private bidders is better containment of overhead costs and greater investment efficiency. This mechanism ties well with the agency cost channel documented above.

5 Conclusion

Using a dataset covering both public and large private U.S. firms, we examine the effect of public versus private ownership on post-merger operating performance improvements. This comparison allows us to study the effect of incentive alignment on takeover gains. Besides, private acquirers are of great interest in their own right, since virtually all existing evidence

on acquirer performance is limited to public bidders.

We find that, on average, private acquirers experience greater operating performance improvements following takeovers. This effect is not driven by differences in target types, merger accounting effects, financing constraints, private equity ownership, or benefits of subsequent listing, and is robust to instrumentation. Further tests suggest that incentive alignment can, indeed, account for the private bidder effect. Differences in operating performance improvements are largest when external pressure from product market competition is weak, and the private bidder effect is driven by firms with high CEO ownership and ownership concentration, and fewer limits to shareholder rights. Overall, this evidence supports the view that private firms face fewer agency problems and make better investment decisions as a result.

Our findings also help interpret some of the existing results in the literature. Private bidders are known to pay lower premiums in acquisitions of public firms (Bargeron, Schlingemann, Stulz, and Zutter (2008)) – a result we confirm in a broader sample of deals using transaction multiples. This could be due to discipline coming from stronger incentive alignment in private firms, but lower prices could also be due to private firms engaging in deals with lower overall synergy gains (perhaps because they cannot compete for better deals with less financially constrained public bidders). Our results suggest it is the former case. Overall, not only do private firms pay lower prices for target firm assets, they also operate those assets more efficiently by containing overhead costs and capital expenditures.

One limitation of our analysis is that private firms in Capital IQ are not representative of a typical private firm. Thus, our results are not necessarily generalizable to the whole universe of private firms. However, to the extent that the channel behind the private bidder effect is lower agency costs, small private firms that do not appear in Capital IQ are likely to have even less separation of ownership and control and even closer incentive alignment than the private firms we study.

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Table 1: **Sample Distribution by Bidder Type**

The sample includes all Capital IQ completed cash-only mergers and acquisitions announced between 1997 and 2010 that result in 100% ownership by the bidder. The aggregate deal value is in CPI-adjusted 2009 millions of dollars. The sample contains 5,321 deals involving public bidders and 1,065 deals involving private bidders.

	All deals		Public bidders		Private bidders		Fraction of deals	
Year	n	Deal value ($m)	n	Deal value ($m)	n	Deal value ($m)	Private bidders	Private targets
1997	48	10,979	23	5,528	25	5,451	0.52	0.73
1998	153	54,216	110	39,244	43	14,624	0.28	0.75
1999	202	93,756	138	74,019	64	19,154	0.32	0.69
2000	304	141,416	239	107,839	65	33,084	0.21	0.85
2001	351	121,741	278	103,947	73	17,366	0.21	0.86
2002	345	52,410	284	49,334	61	2,807	0.18	0.91
2003	427	63,063	344	51,056	83	11,862	0.19	0.90
2004	520	141,464	443	68,687	77	67,520	0.15	0.93
2005	642	138,251	522	115,597	120	21,553	0.19	0.92
2006	701	189,811	587	166,579	114	21,251	0.16	0.92
2007	773	195,261	650	186,446	123	8,434	0.16	0.90
2008	711	128,315	636	113,017	75	14,464	0.11	0.92
2009	461	102,518	404	69,581	57	31,253	0.12	0.95
2010	748	125,081	663	119,439	85	5,509	0.11	0.92
Total	6,386	1,558,282	5,321	1,270,313	1,065	274,332	0.17	0.90

Table 2: **Summary Statistics on Bidder and Deal Characteristics**

The sample includes all Capital IQ completed cash-only mergers and acquisitions announced between 1997 and 2010 that result in 100% ownership by the bidder. The sample contains 5,321 deals involving public bidders and 1,065 deals involving private bidders. Panel A reports mean and medain values for bidder characteristics one year before the announcement date. Panel B reports the mean and median values for deal characteristics. Tests for differences in means and medians of each characteristic between public and private bidders are also shown. Symbols ***, **, and * denote significant differences at the 1%, 5% and 10% levels, respectively. All variables are defined in the Appendix. Data are from Capital IQ.

	Private Bidder		Public Bidder	
	Mean	Median	Mean	Median
Panel A: Bidder characteristics (one year before deal)				
Total assets ($m)	4,437.714***	561.219***	6,418.794	1,295.376
Operating income ($m)	444.834***	63.757***	1,138.230	169.005
Return on assets (ROA)	0.138***	0.107***	0.153	0.137
Δ ROA $(-2,-1)$	0.124***	0.021	0.074	0.016
Asset turnover (ATO)	0.988	0.795***	1.017	0.869
Δ ATO $(-2,-1)$	0.006	0.006	-0.004	-0.004
Return on sales (ROS)	0.221***	0.161	0.209	0.162
Book leverage	0.367***	0.377***	0.190	0.169
Cash	0.097***	0.038***	0.161	0.088
Age	33.953***	20.000***	46.385	30.000
Segment	1.801***	1.000***	3.432	3.000
Tangibility	0.223	0.169***	0.212	0.140
Capital expenditure	0.048	0.025***	0.047	0.032
R&D	0.012***	0.000***	0.032	0.006
Sales growth	0.314***	0.147***	0.136	0.101
Panel B: Deal characteristics				
Deal value ($m)	270.388	28.150***	238.740	38.854
Relative size	0.201***	0.064***	0.095	0.030
Private Target	0.917	1.000	0.897	1.000
Non-US target	0.125***	0.000***	0.166	0.000
Hostile	0.001	0.000	0.002	0.000
Solicited	0.086***	0.000***	0.055	0.000
Diversifying	0.295**	0.000**	0.261	0.000

Table 3: **Operating Performance Improvements Following Takeovers**

This table reports mean operating performance improvements, Δ ATO(-1,$+j$) and Δ ROA(-1,$+j$) ($j = 1, 2, 3$), for public and private bidders over the sample period 1997–2010. Year -1 is the last fiscal year prior deal completion. Year $+i$ is the ith fiscal year after deal completion. Industry-adjusted performance improvements are net of the contemporaneous median performance change of all firms in the bidder's 2-digit SIC industry. Control-firm-adjusted performance improvements are net of the contemporaneous performance change of a control firm chosen in year -1. The control firm is of the same listing status, comes from the same 2-digit SIC industry, and exhibits the level of ROA in year -1 closest to that of the bidder. Symbols ***, **, and * denote the significant differences at the 1%, 5% and 10% levels, respectively.

	From year i to year j		
	-1 to $+1$	-1 to $+2$	-1 to $+3$
		Private bidder	
Δ Return on assets (ROA)	6.09%***	5.77%***	2.01%*
Δ Asset turnover (ATO)	3.64%***	4.61%***	5.06%***
Industry-adjusted Δ ROA	3.77%**	3.36%	0.26%
Industry-adjusted Δ ATO	2.18%**	2.73%**	3.07%**
Control-firm-adjusted Δ ROA	4.76%**	6.05%**	3.96%
Control-firm-adjusted Δ ATO	2.45%	4.88%**	4.54%
		Public bidder	
Δ Return on assets (ROA)	-0.38%	-0.88%*	-1.41%***
Δ Asset turnover (ATO)	-0.79%***	-1.53%***	-1.49%***
Industry-adjusted Δ ROA	-1.01%***	-0.42%	-0.87%***
Industry-adjusted Δ ATO	-1.35%***	-1.26%***	-0.68%*
Control-firm-adjusted Δ ROA	-1.40%**	-1.23%	-2.01%***
Control-firm-adjusted Δ ATO	-0.42%	-0.78%**	-0.91%**
		Private bidder $-$ Public bidder	
Δ Return on assets (ROA)	6.47%***	6.65%***	3.42%**
Δ Asset turnover (ATO)	4.43%***	6.14%***	6.55%***
Industry-adjusted Δ ROA	4.78%***	3.78%***	1.13%*
Industry-adjusted Δ ATO	3.53%***	3.99%***	3.75%***
Control-firm-adjusted Δ ROA	6.16%***	7.28%***	5.97%**
Control-firm-adjusted Δ ATO	2.87%***	5.66%***	5.45%***

Table 4: **Operating Performance Improvements: Regression Analysis**

This table reports regression estimates for percentage changes in ROA or ATO for acquirers. The dependent variables are Δ ROA(−1,+j) or Δ ATO(−1,+j) ($j = 1, 2, 3$). The main explanatory variable, Private bidder, is an indicator variable that equals one if the bidder is a private firm. All variables are defined in the Appendix. Industry (based on 2-digit SIC) and year fixed effects are included. Standard errors allowing for clustering at the firm level are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

	Δ ROA			Δ ATO		
	(−1,+1)	(−1,+2)	(−1,+3)	(−1,+1)	(−1,+2)	(−1,+3)
Private bidder	0.095***	0.091***	0.074**	0.059***	0.071***	0.078***
	(0.024)	(0.030)	(0.037)	(0.017)	(0.022)	(0.028)
ROA/ATO(−1)	−0.668***	−1.013***	−1.343***	−0.082***	−0.098***	−0.127***
	(0.090)	(0.139)	(0.179)	(0.008)	(0.010)	(0.011)
Δ ROA/ATO(−2, −1)	−0.347***	−0.267***	−0.219***	−0.101***	−0.088***	−0.098***
	(0.019)	(0.020)	(0.019)	(0.022)	(0.028)	(0.031)
Log(revenue)	−0.008*	−0.011**	−0.006	−0.003	−0.006*	−0.008**
	(0.004)	(0.005)	(0.006)	(0.002)	(0.003)	(0.004)
Private target	0.001	−0.005	−0.011	−0.001	0.016	0.012
	(0.015)	(0.018)	(0.020)	(0.010)	(0.011)	(0.013)
Relative size	−0.271***	−0.299***	−0.209**	−0.194***	−0.242***	−0.201***
	(0.078)	(0.093)	(0.101)	(0.049)	(0.056)	(0.066)
Squared relative size	0.281***	0.345***	0.164	−0.036	0.064	−0.001
	(0.086)	(0.103)	(0.114)	(0.054)	(0.063)	(0.068)
Log(age)	−0.009	−0.009	−0.017*	−0.011**	−0.005	−0.013*
	(0.007)	(0.009)	(0.010)	(0.005)	(0.006)	(0.007)
Hostile	0.064	−0.012	−0.066	−0.118***	−0.146***	−0.137
	(0.053)	(0.042)	(0.050)	(0.043)	(0.052)	(0.084)
Solicited	0.067***	0.059**	0.077**	0.023*	0.028*	0.034**
	(0.022)	(0.025)	(0.030)	(0.013)	(0.016)	(0.017)
Diversifying	−0.013	−0.013	−0.005	−0.008	−0.018**	−0.011
	(0.011)	(0.014)	(0.015)	(0.007)	(0.008)	(0.010)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,427	5,397	5,346	5,298	5,271	5,235
R^2	0.292	0.226	0.219	0.153	0.137	0.156

Table 5: **Do Private Bidders Buy More Profitable Targets?**

Panel A reports the mean ROA and ATO of target firms acquired by public and private bidders one year before the deal. Panel B reports the mean percentage changes in ROA and ATO of target firms acquired by public and private bidders as of the last fiscal year prior to the deal relative to the year before. Panel C reports mean and median transaction multiples (Deal value/Assets, Deal Value/Sales, and Deal value/Operating Income) paid by public and private bidders. Tests for differences are also shown. Panel D reports the coefficient of interest from regression specifications identical to those in Table 4, except that the dependent variable is computed using the weighted-average performance of the bidder and the target in year $t-1$ (with total assets as weights). Standard errors are reported in parentheses. Symbols ***, **, and * denote the significant differences at the 1%, 5% and 10% levels, respectively.

Target's characteristics	Acquired by Private firms	Acquired by Public firms	Test of differences
	Panel A: Level		
Return on asset (ROA)	5.52%	5.06%	0.46%
Asset turnover (ATO)	13.88%	12.84%	1.04%
	Panel B: Growth		
Δ Return on asset (ROA)	6.67%	7.53%	−0.86%
Δ Asset turnover (ATO)	3.80%	5.59%	−1.79%
	Panel C: Prices Paid		
Deal value/Assets			
Mean	2.06	2.80	−0.74***
Median	1.77	2.15	−0.38***
Deal value/Sales			
Mean	1.87	2.97	−1.10***
Median	1.61	2.01	−0.40***
Deal value/Operating Income			
Mean	9.95	13.40	−3.45***
Median	10.18	11.88	−1.70**

Panel D: Regressions using prices paid

	Deal value/Assets	Deal value/Sales	Deal value/OI
Private bidder	-0.724^{***}	-1.138^{***}	-3.330^{**}
	(0.144)	(0.206)	(1.406)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Observations	843	844	844

Panel E: Regressions using combined firm performance in year $t-1$

	Δ ROA			Δ ATO		
	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$
Private bidder	0.142^{***}	0.056	0.202^{***}	0.086^{***}	0.112^{***}	0.163^{***}
	(0.054)	(0.060)	(0.072)	(0.024)	(0.041)	(0.045)
Observations	845	833	826	882	869	864

Table 6: **Merger Accounting? Changes in Return on Sales (ROS)**

This table reports the univariate comparisons (Panel A) and regression estimates (Panel B) of Δ ROS(−1,+j) as a measure of performance improvement that is free from merger accounting effects. Only the coefficients of interests are shown. The regression specifications are otherwise identical to those in Table 4. Industry (based on 2-digit SIC) and year fixed effects are included. Standard errors allow for clustering at the firm level and are reported in parentheses. Only coefficients of interests are reported. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

Panel A. Univariate Comparisons

	From year i to year j		
	−1 to +1	−1 to +2	−1 to +3
		Private bidder	
Δ Return on sales (ROS)	5.98%***	3.96%***	3.37%**
Industry-adjusted Δ ROS	6.96%***	5.71%**	3.04%**
Control-firm-adjusted Δ ROS	4.46%**	5.56%**	2.05%
		Public bidder	
Δ Return on sales (ROS)	−0.20%	−0.37%	−0.49%
Industry-adjusted Δ ROS	−0.34%**	−1.02%**	−0.23%**
Control-firm-adjusted Δ ROS	−0.33%	−0.72%	−0.63%
		Private bidder − Public bidder	
Δ Return on sales (ROS)	6.18%***	4.33%***	3.86%**
Industry-adjusted Δ ROS	7.30%***	6.73%***	3.27%**
Control-firm-adjusted Δ ROS	4.79%***	6.28%***	2.68%

Panel B. Regression Estimates

	Δ ROS(−1,+1)	Δ ROS(−1,+2)	Δ ROS(−1,+3)
Private bidder	0.082***	0.069***	0.062**
	(0.019)	(0.022)	(0.025)
Observations	5,379	5,339	5,339

Table 7: **Access to Capital**

This table reports the results of tests conditioning the private bidder effect on proxies for financing constraints. The dependent variables are Δ ROA$(-1,+j)$ or Δ ATO$(-1,+j)$ $(j = 1, 2, 3)$. Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Standard errors allow for clustering at the firm level and are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

	Δ ROA			Δ ATO		
	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$
Panel A. SA Index						
Private bidder×SA index(low)	0.191***	0.153**	0.194**	0.099***	0.162***	0.198***
	(0.054)	(0.062)	(0.084)	(0.035)	(0.053)	(0.068)
Private bidder×SA index(medium)	0.037	0.068	0.019	0.087***	0.094***	0.123***
	(0.037)	(0.048)	(0.056)	(0.030)	(0.036)	(0.041)
Private bidder×SA index(high)	0.111***	0.097**	0.072	0.009	0.004	−0.032
	(0.035)	(0.040)	(0.052)	(0.025)	(0.038)	(0.045)
Observations	5,427	5,397	5,346	5,298	5,271	5,235
Panel B. Free Cash Flows (FCF)						
Private bidder×FCF(low)	0.128**	0.043	0.065	0.007	0.057	0.065
	(0.050)	(0.052)	(0.073)	(0.032)	(0.053)	(0.067)
Private bidder×FCF(medium)	0.081**	0.104**	0.128**	0.113***	0.088***	0.099**
	(0.032)	(0.050)	(0.059)	(0.030)	(0.030)	(0.039)
Private bidder×FCF(high)	0.085**	0.074*	0.114**	0.039*	0.063**	0.067*
	(0.034)	(0.039)	(0.056)	(0.022)	(0.026)	(0.040)
Observations	5,427	5,397	5,346	5,275	5,248	5,212
Panel C. Leverage						
Private bidder×Leverage(low)	0.176***	0.140**	0.164**	0.086***	0.126***	0.193***
	(0.062)	(0.059)	(0.079)	(0.033)	(0.048)	(0.065)
Private bidder×Leverage(medium)	0.007	0.017	−0.059	0.072**	0.048	0.053
	(0.042)	(0.053)	(0.060)	(0.035)	(0.035)	(0.042)
Private bidder×Leverage(high)	−0.023	0.017	0.018	0.048*	0.073**	0.060
	(0.037)	(0.039)	(0.053)	(0.028)	(0.031)	(0.045)
Observations	5,427	5,397	5,346	5,298	5,271	5,235

Table 8: **Subsequent Listing and Organizational Form**

This table reports the results of several robustness checks and additional tests. The dependent variables are Δ ROA(−1,+j) or Δ ATO(−1,+j) ($j = 1, 2, 3$). Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Standard errors allow for clustering at the firm level and are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

	Δ ROA			Δ ATO		
	(−1,+1)	(−1,+2)	(−1,+3)	(−1,+1)	(−1,+2)	(−1,+3)
Panel A. Firms not Changing Listing Status Following Takeovers						
Private bidder	0.088***	0.085**	0.097**	0.070***	0.077***	0.099***
	(0.026)	(0.033)	(0.044)	(0.019)	(0.025)	(0.032)
Observations	5,323	5,295	5,247	5,215	5,191	5,157
Panel B. Public Parent Ownership						
Private bidder	0.094***	0.073**	0.076**	0.058***	0.060**	0.052**
	(0.027)	(0.034)	(0.038)	(0.020)	(0.025)	(0.024)
Public parent	0.005	0.095	0.011	0.003	0.056	0.037
	(0.050)	(0.059)	(0.071)	(0.040)	(0.058)	(0.066)
Observations	5,427	5,397	5,346	5,298	5,271	5,235
Panel C. Private Equity Ownership						
Private bidder	0.088***	0.074**	0.085**	0.063***	0.077***	0.074***
	(0.025)	(0.032)	(0.038)	(0.019)	(0.025)	(0.028)
Non-PE backed	0.029	0.105	−0.084	−0.059**	−0.077*	−0.059
	(0.059)	(0.082)	(0.081)	(0.029)	(0.041)	(0.045)
Observations	5,427	5,397	5,346	5,298	5,271	5,235

Table 9: **Selection on Observables: Propensity Score Matching**

This table reports the results of propensity score matching analysis. Nearest propensity score neighbour matching with replacement is used. Panel A reports the estimation results of the first-stage propensity score probit model. The variables used in the propensity score estimation are log(revenue), the level of ROA and the change in ROA one year prior to the deal, log(age), cash holdings, leverage, and industry and year fixed effects. Panel A also reports means of characteristics entering propensity score estimation for private bidders and matched public bidders, as well as a test for differences. Panel B presents mean differences in Δ ROA and Δ ATO between private bidders and their propensity score matched public bidders. Symbols *, **, *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Panel C reports regression estimates for the matched sample. Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Industry (based on 2-digit SIC) and year fixed effects are included. Standard errors allow for clustering at the firm level and are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

Panel A. First stage probit regression

First stage probit Dependent variable: private bidder		Diagnostics after PSM Private bidder	 Public bidder	 t-stat
Log(revenue)	-0.142^{***} (0.018)	6.260	6.215	0.35
ROA(-1)	1.062^{***} (0.133)	0.168	0.145	1.68
Δ ROA$(-2,-1)$	0.095^{*} (0.048)	0.135	0.206	-1.39
Log(age)	-0.057^{**} (0.027)	2.944	2.971	-0.30
Cash	-0.486^{**} (0.207)	0.096	0.093	0.24
Leverage	2.634^{***} (0.144)	0.388	0.360	1.67
Industry fixed effects	Yes			
Year fixed effects	Yes			
Observations	5,827			
R^2	0.276			

Panel B. Univariate Comparisons after PSM

	From year i to year j		
	-1 to $+1$	-1 to $+2$	-1 to $+3$
	Private bidder		
Δ Return on assets (ROA)	8.74%***	8.62%***	5.87%**
Δ Asset turnover (ATO)	4.78%***	6.78%***	6.84%***
	Matched public bidder		
Δ Return on assets (ROA)	-2.33%	-1.29%	-1.64%
Δ Asset turnover (ATO)	-2.97%***	-3.20%***	-3.18%***
	Private bidder − Matched public bidder		
Δ Return on assets (ROA)	11.07%***	9.91%**	7.51%**
Δ Asset turnover (ATO)	7.75%***	9.98%***	10.02%***

Panel C. Regression on the matched sample

	Δ ROA			Δ ATO		
	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$
Private bidder	0.115***	0.101***	0.072*	0.067***	0.067***	0.071***
	(0.033)	(0.038)	(0.041)	(0.019)	(0.024)	(0.028)
Observations	1,364	1,328	1,254	1,230	1,192	1,154

Table 10: **Instrumenting Listing Status with VC Supply at Founding**

This table reports the results of instrumental variable (IV) analysis. Following Asker, Farre-Mensa, and Ljungqvist (2015) and Gao, Harford, and Li (2013), we first run a probit regression of $PrivateBidder$ as the dependent variable on the instrument ($VCsupply$), and then use the predicted probability from this probit regression as an instrument for the private bidder indicator in the usual 2SLS framework. Panel A reports estimation results of the first-stage regression. The F-test for the significance of the instrument is also shown. Panel B reports estimation results of the second-stage regression of Δ ROA$(-1,+j)$ or Δ ATO$(-1,+j)$ $(j = 1, 2, 3)$ on the instrumented private bidder indicator. Only the coefficients of interests are shown; other covariates in both stages are the same as those in Table 4. Industry (based on 2-digit SIC) and year fixed effects are included. Standard errors reported in parentheses allow for clustering at the firm level. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

Panel A. First-Stage Regression

	Dependent variable: Private bidder					
Instrument: VCsupply	−1.151***	−1.071***	−1.178***	−0.970**	−1.067***	−1.071***
	(0.449)	(0.441)	(0.447)	(0.423)	(0.434)	(0.436)
F-stat	14.60	11.60	10.71	13.82	9.69	7.75
R^2	0.246	0.237	0.239	0.186	0.199	0.198
Observations	3,249	3,233	3,141	3,237	3,215	3,102

Panel B. IV Second-Stage Regression

	Δ ROA			Δ ATO		
	(−1,+1)	(−1,+2)	(−1,+3)	(−1,+1)	(−1,+2)	(−1,+3)
Private bidder	0.657**	0.754***	0.621*	0.362**	0.414**	0.644**
	(0.272)	(0.259)	(0.341)	(0.161)	(0.202)	(0.279)
R^2	0.318	0.282	0.280	0.247	0.234	0.237
Observations	3,249	3,233	3,141	3,237	3,215	3,102

Table 11: **Governance Across Private and Public Bidders**

This table presents descriptive statistics on direct firm-level governance measures for public and private bidders. Takeover Defence Score is an index of 24 corporate governance provisions from Capital IQ, scaled to range from 0 to 1, with higher values indicating stronger limits to shareholder rights. CEO ownership is the fraction of company shares owned by the CEO (available from year 2000). Outside Top1 Ownership and Outside Top 5 Ownership are the fractions of company shares owned by top 1 and top 5 outside shareholders, respectively (available from year 2004). Symbols *, **, and *** denote values that are significantly different between public and private bidders at the 10%, 5%, and 1% level, respectively.

	Private Bidders			Public Bidders		
	Mean	Median	Obs.	Mean	Median	Obs.
Takeover Defence Score	0.243	0.21	754	0.321***	0.30***	4,960
CEO Ownership	0.068	0.017	423	0.036***	0.002***	4,670
Outside Top1 Ownership	0.492	0.512	237	0.097***	0.071***	3,235
Outside Top5 Ownership	0.605	0.623	184	0.168***	0.136***	3,234

Table 12: **The Agency Cost Channel**

This table reports the results of tests conditioning the private bidder effect on governance characteristics. The dependent variables are Δ ROA$(-1,+j)$ or Δ ATO$(-1,+j)$ $(j = 1, 2, 3)$. Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Standard errors allow for clustering at the firm level and are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

	Δ ROA			Δ ATO		
	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$	$(-1,+1)$	$(-1,+2)$	$(-1,+3)$
Panel A. CEO Ownership						
Private bidder×CEO(low)	0.085	0.176*	−0.032	0.112*	0.082	0.090
	(0.056)	(0.097)	(0.090)	(0.058)	(0.056)	(0.073)
Private bidder×CEO(medium)	−0.014	0.002	0.290**	0.026	0.117***	0.122
	(0.045)	(0.055)	(0.141)	(0.028)	(0.040)	(0.079)
Private bidder×CEO(high)	0.124***	0.148***	0.095	0.056**	0.088***	0.059
	(0.046)	(0.048)	(0.073)	(0.022)	(0.033)	(0.040)
Observations	4,526	4,509	4,468	4,536	4,509	4,490
Panel B. Outside Top5 Ownership						
Private bidder×Outside Top5(low)	0.054	0.076	0.041	0.194	0.089	0.161
	(0.147)	(0.065)	(0.055)	(0.135)	(0.111)	(0.109)
Private bidder×Outside Top5(medium)	0.027	−0.141	−0.084	0.121	0.229**	0.296***
	(0.060)	(0.122)	(0.072)	(0.074)	(0.092)	(0.076)
Private bidder×Outside Top5(high)	0.036	0.138**	0.144**	0.032	0.091**	0.096*
	(0.036)	(0.054)	(0.066)	(0.022)	(0.039)	(0.051)
Observations	3,111	3,118	3,095	3,111	3,126	3,119
Panel C. Outside Top1 Ownership						
Private bidder×Outside Top1(low)	0.026	0.078	−0.026	0.144	0.150*	0.169*
	(0.102)	(0.070)	(0.059)	(0.099)	(0.091)	(0.094)
Private bidder×Outside Top1(medium)	0.050	0.060	−0.109	0.201***	0.374***	0.369***
	(0.050)	(0.066)	(0.088)	(0.061)	(0.039)	(0.047)
Private bidder×Outside Top1(high)	0.015	0.091	0.142**	0.049**	0.117***	0.158***
	(0.035)	(0.061)	(0.070)	(0.023)	(0.035)	(0.041)
Observations	3,068	3,077	3,061	3,065	3,082	3,080

Panel D. Takeover Defence Score						
Private bidder×TakeoverDefScore(low)	0.093***	0.087**	0.100**	0.062**	0.144***	0.140***
	(0.035)	(0.037)	(0.049)	(0.024)	(0.038)	(0.052)
Private bidder×TakeoverDefScore(medium)	0.084*	−0.017	0.002	0.075**	0.064	0.087
	(0.044)	(0.054)	(0.055)	(0.037)	(0.052)	(0.054)
Private bidder×TakeoverDefScore(high)	0.117***	0.087	0.126*	0.052	−0.013	0.007
	(0.044)	(0.062)	(0.074)	(0.046)	(0.040)	(0.046)
Observations	5,074	5,038	4,986	4,961	4,934	4,901
Panel E. SIC3 HHI						
Private bidder×HHI(low)	0.085	0.027	−0.012	0.032	0.033	0.019
	(0.069)	(0.040)	(0.048)	(0.031)	(0.037)	(0.043)
Private bidder×HHI(medium)	0.125***	0.111*	0.077**	0.081**	0.053	0.043
	(0.045)	(0.057)	(0.035)	(0.033)	(0.042)	(0.054)
Private bidder×HHI(high)	0.059	0.082*	0.104*	0.054**	0.120***	0.158***
	(0.038)	(0.049)	(0.063)	(0.023)	(0.040)	(0.049)
Observations	5,404	5,374	5,326	5,277	5,250	5,215
Panel F. Hoberg-Philips HHI						
Private bidder×HHI(low)	0.082*	0.035	−0.017	−0.006	−0.025	−0.065
	(0.045)	(0.046)	(0.056)	(0.038)	(0.049)	(0.056)
Private bidder×HHI(medium)	0.150***	0.104*	0.136*	0.106***	0.134***	0.124**
	(0.045)	(0.059)	(0.074)	(0.032)	(0.037)	(0.051)
Private bidder×HHI(high)	0.087**	0.132**	0.103*	0.055**	0.066**	0.107***
	(0.041)	(0.058)	(0.060)	(0.023)	(0.027)	(0.032)
Observations	4,748	4,716	4,676	4,661	4,624	4,606

Table 13: **Changes in SGA, COGS and CAPEX across Bidders**

This table reports percentage changes in Selling General & Administration Expenses (SGA), Cost of Goods Sold (COGS), and Capital Expenditure (CAPEX) for public and private bidders over the sample period 1997–2010. All variables are scaled by total assets. Year -1 is the last fiscal year prior to deal completion. Year $+i$ is the ith fiscal year after deal completion. Symbols ***, **, and * denote the significant differences at the 1%, 5% and 10% levels, respectively.

From year i to j	Private Bidder	Public Bidder	Test of Differences
	Panel A: Δ SGA		
$(-1,+1)$	$-1.65\%^{***}$	$-0.79\%^{***}$	$-0.86\%^{***}$
$(-1,+2)$	$-1.97\%^{***}$	$-1.15\%^{***}$	$-0.82\%^{***}$
$(-1,+3)$	$-2.78\%^{***}$	$-1.41\%^{***}$	$-1.36\%^{***}$
	Panel B: Δ COGS		
$(-1,+1)$	$-1.52\%^{***}$	$-1.53\%^{***}$	0.01%
$(-1,+2)$	$-2.13\%^{***}$	$-2.29\%^{***}$	0.15%
$(-1,+3)$	$-1.16\%^{***}$	$-1.70\%^{***}$	$0.54\%^{*}$
	Panel C: Δ CAPEX		
$(-1,+1)$	$-0.53\%^{***}$	$-0.16\%^{***}$	$-0.36\%^{***}$
$(-1,+2)$	$-0.81\%^{***}$	$-0.34\%^{***}$	$-0.46\%^{***}$
$(-1,+3)$	$-1.26\%^{***}$	$-0.45\%^{***}$	$-0.80\%^{***}$

A Appendix

Table A.1: **Variable Definitions**

All variables are from Capital IQ unless otherwise noted.

Variable	Definition
Key Dependent Variables	
Δ ROA$(-1,+j)$	Percentage change in ROA margin, defined as ROA(+j) minus ROA(-1), scaled by the absolute value of ROA(-1), where year +j is the j'th year following the deal
Δ ATO$(-1,+j)$	Percentage change in ATO margin, defined as ATO(+j) minus ATO(-1), scaled by the absolute value of ATO(-1), where year +j is the j'th year following the deal
Δ ROS$(-1,+j)$	Percentage change in ROS margin, defined as ROS(+j) minus ROS(-1), scaled by the absolute value of ROS(-1), where year +j is the j'th year following the deal
Firm and Deal Characteristics	
Total assets	Total Assets, reported in CPI-adjusted 2009 millions of dollars
Operating income	Total Revenue less Cost of Goods Sold and Selling General & Admin Exp, reported in CPI-adjusted 2009 millions of dollars
Return on assets (ROA)	Operating income scaled by total assets
Asset turnover (ATO)	Total revenue scaled by total assets
Return on sales (ROS)	Operating income scaled by total revenue
Book leverage	Long term debt scaled by total assets
Cash	Total Cash & shot-term investments scaled by total assets
Age	Firm's age since the year founded
Segment	Number of business segments
Tangibility	Net property, plant & equipment scaled by total assets
CAPEX/Total Assets	Capital expenditure scaled by total assets
R&D	R&D expenditure scaled by total assets
Sales growth	Annual increase in total revenue scaled by beginning-of-year total revenue

Table A.1: **Variable Definitions (continued)**

Variable	Definition
Deal value	Total transaction value, reported in CPI-adjusted 2009 millions of dollars
Relative size	Deal value scaled by Total Assets of the bidder
Private target	Indicator variable taking the value of one if the target firm is private, and zero otherwise
Non-US target	Indicator variable taking the value of one if the target firm is non-US, and zero otherwise
Hostile	Indicator variable taking the value of one if the deal is reported as hostile, and zero otherwise
Solicited	Indicator variable taking the value of one if the the deal is reported as solicited, and zero otherwise
Diversifying	Indicator variable taking the value of one if the bidder and the target do not share the same two-digit SIC code, and zero otherwise
Public parent	Indicator variable taking the value of one if the parent company of the bidder is listed, and zero otherwise
Non-PE backed	Indicator variable taking the value of one if the bidder is private and has never received private equity investment, and zero otherwise
Financing Constraints Proxies	
SA Index	$(-0.737 \times Size) + (0.043 \times Size^2) - (0.040 \times Age)$, where Size is the log of book assets, and Age is the number of years from foundation. Size is capped at the log of \$4.5 billion, and age is capped at 37 years following Hadlock and Pierce (2010)
Free cash flow (FCF)	Operating income minus interest minus tax minus dividends paid, scaled by total assets
Leverage	Long term debt scaled by total assets
Governance Proxies	
SIC3 HHI	The sum of squared market shares of all firms in the same 3-digit SIC industry (from Compustat)
Hoberg and Phillips HHI	The sum of squared market shares of all public and private firms in the same 3-digit SIC industry from Hoberg and Phillips (2016)
Takeover Defence Score	Index of 24 corporate governance provisions, scaled to range from zero to one, with higher values indicating greater limits to shareholder rights

Table A.1: **Variable Definitions (continued)**

Variable	Definition
CEO Ownership	Fraction of company shares owned by the CEO (available from year 2000). Data from Huasheng Gao (NTU).
Outside Top1 Ownership	Fraction of company shares owned by top 1 outside shareholder (available from year 2000). Data from Huasheng Gao (NTU).
Outside Top5 Ownership	Fraction of company shares owned by top 5 outside shareholders (available from year 2004). Data from Huasheng Gao (NTU).
Instrument for private status	
VCsupply	Number of firms receiving first-round VC funding in the firm's headquarter state two years after the firm was founded, scaled by the number of firms in the state that were less than three years old at that time. VC data is from VenureExpert, and the number of firms less than three years old is from the Longitudinal Business Database of the U.S. Census Bureau. We obtain this variable directly from the authors of Asker, Farre-Mensa, and Ljungqvist (2015) study.

Table A.2: **Summary Statistics on Bidders vs. All Firms in Capital IQ**

The sample includes all Capital IQ completed cash-only mergers and acquisitions announced between 1997 and 2010 that result in 100% ownership by the bidder. The sample also contains 23,286 firm-year observations for 2,189 public firms and 9,920 firm-year observations for 3,283 private firms, collected from Capital IQ. This table compares the bidder's characteristics one year before the deal to all firms in Capital IQ. Panel A reports mean and median values for private companies. Panel B reports mean values for public companies. Symbols ***, **, and * denote the significant differences between bidders and all firms at the 1%, 5% and 10% levels, respectively.

	Bidders in Capital IQ		All Capital IQ firms	
	Mean	Median	Mean	Median
Panel A: private companies				
Total assets ($m)	4,437.714***	561.219***	1,216.290	158.383
Operating income ($m)	444.834***	63.757***	71.802	7.046
Return on assets (ROA)	0.138***	0.107***	0.061	0.062
Asset turnover (ATO)	0.988***	0.795***	1.313	1.056
Return on sales (ROS)	0.221***	0.161***	0.075	0.065
Book leverage	0.367***	0.377	0.419	0.369
Cash	0.097***	0.038*	0.121	0.046
Age	33.953***	20.000***	26.513	13.000
Segment	1.801***	1.000***	1.437	1.000
Tangibility	0.223***	0.169***	0.310	0.227
Capital expenditure	0.048***	0.025***	0.067	0.037
R&D	0.012***	0.000***	0.020	0.000
Sales growth	0.314***	0.147***	0.268	0.099
Panel B: public companies				
Total assets ($m)	6,418.794***	1,295.376***	2,738.245	489.600
Operating income ($m)	1,138.23***	169.005***	267.333	37.900
Return on assets (ROA)	0.153***	0.137***	0.081	0.085
Asset turnover (ATO)	1.017***	0.869***	1.155	1.019
Return on sales (ROS)	0.209***	0.162***	0.085	0.082
Book leverage	0.19	0.169***	0.187	0.141
Cash	0.161	0.088	0.163	0.088
Age	46.385*	30.000	45.331	31.000
Segment	3.432***	3.000***	2.922	3.000
Tangibility	0.212***	0.140***	0.262	0.195
Capital expenditure	0.047***	0.032***	0.071	0.037
R&D	0.032***	0.006***	0.028	0.000
Sales growth	0.136	0.101	0.107	0.083

Table A.3: **Operating Performance Changes across Firm Type in the Population of Capital IQ Firms**

The sample contains 23,286 firm-year observations for 2,189 public firms and 9,920 firm-year observations for 3,283 private firms, collected from Capital IQ. For each private firm, we select a matched public firm closest in size (total assets) from the same industry (2-digit SIC code) and year. This table reports the differences of mean percentage changes in operating income as a percentage of assets (Δ ROA), and in total revenue as a percentage of assets (Δ ATO) between all private firms and all public firms, as well as between all private firms and matched public firms. Year 0 represents current fiscal year. Year $+i$ is ith year after. Symbols ***, **, and * denote the significant differences at the 1%, 5% and 10% levels, respectively.

	From year i to year j		
Percentage changes	0 to +1	0 to +2	0 to +3
Panel A: Private firms − Public firms			
Δ Return on assets (ROA)	1.51%**	−0.02%	−1.86%
Δ Asset turnover (ATO)	−0.93%**	−0.89%**	1.16%**
Panel B: Private firms − Matched public firms			
Δ Return on assets (ROA)	0.52%	−1.87%	−3.57%**
Δ Asset turnover (ATO)	0.09%	0.29%	1.20%**

Table A.4: **Analysis using Percentage Point Changes**

Panel A reports the mean percentage point changes in ROA and ATO for public and private bidders over the sample period 1997–2010. Year −1 is the last fiscal year prior deal completion. Year $+i$ is the ith fiscal year after deal completion. Industry-adjusted performance improvements are net of the contemporaneous median performance change of all firms in the bidder's 2-digit SIC industry. Control-firm-adjusted performance improvements are net of the contemporaneous performance change of a control firm chosen in year −1. The control firm is of the same listing status, comes from the same 2-digit SIC industry, and exhibits the level of ROA in year −1 closest to that of the bidder. Panel B reports regression estimates. The dependent variables are Δ ATO(−1,+j) or Δ ROA(−1,+j) ($j = 1, 2, 3$). Private bidder is an indicator variable that equals one if the bidder is a private firm. Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Industry (based on 2-digit SIC) and year fixed effects are included. Standard errors allow for clustering at the firm level and are reported in parentheses. Coefficients denoted by *, **, or *** are significant at the 10%, 5%, or 1% level, respectively.

Panel A. Univariate Comparisons

	From year i to year j		
	−1 to +1	−1 to +2	−1 to +3
		Private bidder	
Δ Return on assets (ROA)	0.20%	0.70%*	0.85%***
Δ Asset turnover (ATO)	0.31%	0.87%	0.10%
Industry-adjusted Δ ROA	1.82%***	1.36%***	0.88%**
Industry-adjusted Δ ATO	0.63%	0.57%	0.81%
Control-firm-adjusted Δ ROA	0.33%	0.14%	0.31%
Control-firm-adjusted Δ ATO	1.55%	0.50%	1.59%
		Public bidder	
Δ Return on assets (ROA)	−0.94%***	−1.29%***	−1.53%***
Δ Asset turnover (ATO)	−0.77%***	−2.53%***	−3.24%***
Industry-adjusted Δ ROA	−0.26%***	−0.39%***	−0.44%***
Industry-adjusted Δ ATO	−1.32%***	−3.76%***	−2.15%***
Control-firm-adjusted Δ ROA	−0.32%***	−0.41%***	−0.54%***
Control-firm-adjusted Δ ATO	−0.98%***	−1.16%***	−1.90%***
		Private bidder − Public bidder	
Δ Return on assets (ROA)	1.14%***	1.99%***	2.38%***
Δ Asset turnover (ATO)	1.08%*	3.40%***	3.34%***
Industry-adjusted Δ ROA	2.08%***	1.75%***	1.32%***
Industry-adjusted Δ ATO	1.95%**	4.33%***	2.96%***
Control-firm-adjusted Δ ROA	0.65%***	0.55%	0.85%
Control-firm-adjusted Δ ATO	2.53%**	1.66%	3.49%**

Panel B. Regression Estimates

	Δ ROA			Δ ATO		
	(−1,+1)	(−1,+2)	(−1,+3)	(−1,+1)	(−1,+2)	(−1,+3)
Private bidder	0.012***	0.007*	0.004	0.024**	0.035**	0.040**
	(0.003)	(0.004)	(0.004)	(0.012)	(0.016)	(0.019)
Observations	5,427	5,397	5,346	5,298	5,271	5,235

Table A.5: **Analysis using Median Percentage Changes**

Panel A presents the median percentage changes in ROA and ATO for public and private bidders over the sample period 1997–2010. Year −1 is the last fiscal year prior deal completion. Year $+i$ is the ith fiscal year after deal completion. Industry-adjusted performance improvements are net of the contemporaneous median performance change of all firms in the bidder's 2-digit SIC industry. Control-firm-adjusted performance improvements are net of the contemporaneous performance change of a control firm chosen in year −1. The control firm is of the same listing status, comes from the same 2-digit SIC industry, and exhibits the level of ROA in year −1 closest to that of the bidder. Panel B reports estimates from quantile regressions estimated at the median. The dependent variables are Δ ATO(−1,+j) or Δ ROA(−1,+j) ($j = 1, 2, 3$). Private bidder is an indicator variable that equals one if the bidder is a private firm. Only the coefficients of interests are shown. The specifications are otherwise identical to those in Table 4. Industry (based on 2-digit SIC) and year fixed effects are included. Robust standard errors are reported in parentheses. Symbols denote *, **, or *** statistical significance at the 10%, 5%, or 1% level, respectively.

Panel A. Univariate Comparisons

	From year i to year j		
	−1 to +1	−1 to +2	−1 to +3
		Private bidder	
Δ Return on assets (ROA)	1.64%**	1.12%*	−2.73%
Δ Asset turnover (ATO)	2.84%**	1.44%*	1.51%***
Industry-adjusted Δ ROA	0.32%*	1.94%*	0.19%
Industry-adjusted Δ ATO	0.59%	0.32%*	0.68%*
Control-firm-adjusted Δ ROA	3.53%**	4.36%***	3.30%**
Control-firm-adjusted Δ ATO	2.42%	−0.50%	1.09%
		Public bidder	
Δ Return on assets (ROA)	−0.74%	−4.05%***	−5.17%***
Δ Asset turnover (ATO)	−2.04%***	−3.54%***	−3.98%***
Industry-adjusted Δ ROA	−2.24%***	−3.79%***	−2.18%**
Industry-adjusted Δ ATO	−2.51%***	−2.47%***	−3.03%***
Control-firm-adjusted Δ ROA	−1.59%**	−1.75%**	−1.47%***
Control-firm-adjusted Δ ATO	−0.43%	−0.59%	−1.28%**
		Private bidder − Public bidder	
Δ Return on assets (ROA)	2.38%**	5.17%**	2.44%*
Δ Asset turnover (ATO)	4.88%***	4.98%***	5.49%***
Industry-adjusted Δ ROA	2.56%**	5.73%***	2.37%
Industry-adjusted Δ ATO	3.10%*	2.79%***	3.71%**
Control-firm-adjusted Δ ROA	5.12%***	6.11%***	4.77%
Control-firm-adjusted Δ ATO	2.85%**	0.09%***	2.37%

Panel B. Regression Estimates

	Δ ROA			Δ ATO		
	(−1,+1)	(−1,+2)	(−1,+3)	(−1,+1)	(−1,+2)	(−1,+3)
Private bidder	0.034**	0.035**	0.012	0.046***	0.059***	0.053***
	(0.013)	(0.018)	(0.020)	(0.011)	(0.010)	(0.016)
Observations	5,427	5,397	5,346	5,298	5,271	5,235

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